

REMARKS

Initially, the Applicant acknowledges the Examiner's indication that claim 20 is objected to but would be considered allowable if rewritten in independent form, stating that the prior art does not suggest three kneading elements wherein the first and last kneading elements are twisted in a first direction and wherein the other elements are twisted in an opposite direction. Consequently, claim 20 has been rewritten in independent form and allowance of this claim is earnestly solicited.

Before discussing specifically the prior art, the Applicant notes that much of the prior art relates to kneading apparatuses or mixers that are wholly unrelated to kneading element technology of screw extruders. Therefore, the Applicant has amended the preamble of claim 1, as well as a portion of claim 9, to provide the proper context for the kneading element(s) of the claimed invention. While not meant to include further limitations to the claims, the preamble does now provide the proper environment for the invention. That is, the present invention relates to a kneading element for a screw extruder for plastics, rubber, and coating applications. Thus, kneading machines and mixers are believed to be irrelevant to the present invention and outside the field of context for the present invention.

Now, turning to the prior art rejections, the Examiner has first rejected claims 1, 2, 4-6, 9-10, 12-19 and 21 as being anticipated by D'Alterio US Patent No. 5,100,240. The Applicant respectfully traverses this rejection.

First, as noted above, D'Alterio relates to a high-speed continuous mixer for solids and liquids. It is not a screw extruder, and as such, does not use a kneading element of the type described by the present invention.

Notwithstanding this argument, the Applicant secondly notes that D'Alterio does not have an outer periphery ridge as defined by the claims. The outer periphery ridge must be on the outer periphery of the lobe. In order for that to be the case, the outer periphery ridge would have to be located (with reference to Fig. 3 of the patent) near the tip of the blade on the leading convex edge 30 side of the blade 28. Assuming arguendo that a case could be made for such a ridge, the Applicant further points out

that the claims require that at least one lobe be concave between the outer periphery ridge and the central portion. If such a periphery ridge is set forth on the convex side of the blade in D'Alterio, then clearly, the blade is not concave between the outer periphery ridge and the central portion, as there is a portion of the tip of the blade 28 in the patent that has a convex curve prior to the concave curve terminating at the central portion.

On the chance, however, that the Examiner believes the outer periphery ridge may be considered the tip of the blade 28 in D'Alterio, which the Applicant strongly traverses, claims 1 and 9 have been amended to include the limitation that the outer periphery ridge traces an arc that is concentric with a substantially circular outer limit of the central portion. That is, in the present invention, the outer periphery ridge is substantially equidistant or parallel at all points from the central portion or outer limit of the central portion. In contrast, the tip of the blade 28 in D'Alterio is practically perpendicular to the central portion of the blade. Support for the limitation can be found in the drawings, particularly in Fig. 1.

In addition to the above arguments, the Applicant also notes that claim 9 has been amended to include the fact each kneading element in the kneading block contacts at least a portion of at least one other kneading element adjacent thereto. In D'Alterio, the blades 28 are separated and do not contact one another.

This also brings to light the fact that the broad surfaces of the blades in D'Alterio are necessarily tapering to form the knife blade 30. Consequently, the Applicant has added a new claim 28 asserting that the at least one lobe further includes first and second broad surfaces at the axial ends of the at least one lobe that are perpendicular to the shaft receiving bore and entirely parallel to each other. Clearly, the present invention is not anticipated by D'Alterio and reconsideration of this rejection is earnestly requested.

Next, the Examiner has rejected claims 1, 2, 4-10, 12-19 and 21 as being anticipated by Inoue et al. US Patent No. 5,9984,516. The Applicant respectfully traverses this rejection as well.

First, Inoue relates to a batch-type enclosed kneading apparatus, not a screw extruder and, therefore, like D'Alterio above, does not use a kneading element of the type claimed in the present invention. A counter-rotating kneading apparatus is not a screw extruder, and the kneading element of the present invention would not be used on such an apparatus.

This argument notwithstanding, Applicant secondly notes that Inoue does not have a shaft receiving bore. Applicant is familiar with the kneading apparatus set forth in Inoue. The rotor used in that invention does not include a shaft. The kneading wings are of one piece and are not removable from any so-called shaft, which is, in fact, a continuous rotor. Applicant specifically directed the Examiner's attention to Figs. 1, 3 and 15 of the Inoue et al. patent. In Fig. 1, it is shown that, if anything, the wings themselves are integrally formed on or attached directly to the rotors 1 and 2. Thus, it is further asserted that Inoue does not even include a central portion having a defined (i.e., substantially circular) outer limit as now claimed in the present invention. In Fig. 3, no shaft or shaft receiving bore is shown, only the direction of rotation of the rotors. Thus, no shaft receiving bore is suggested by this Figure either.

Finally, with respect to Fig. 15, the Examiner asserts that it shows a shaft. However, Applicant, being familiar with this kneading apparatus, knows that this is not the case. In fact, upon close inspection of Fig. 15, the Applicant notes that it does not show a shaft receiving bore. Interestingly, while the backside of the wings 7a, 7b and 7c are illustrated in phantom, there is no shaft shown in phantom. This is because there isn't one. The "shaft" shown is nothing more than the rotor which integrally merges with the rotatable wings as constructed. Such a rotor does not imply a shaft, but rather a solid one-piece construction. There simply is no shaft receiving bore present or suggested for the kneading apparatus of Inoue et al. Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection as well.

Next, the Examiner has rejected claims 1, 3-5, 9, 11-13, and 15-19 as anticipated by Tynan US Patent No. 4,556,324. Again, the Applicant respectfully traverses this rejection.

As above, the Applicant first notes that Tynan relates to a counter-rotating apparatus for generating thin films. It does not relate to a screw extruder or the use of a kneading element therefore.

This notwithstanding, the Applicant notes that the claims of the present invention have been amended to indicate that the length of the outer periphery ridge is shorter than the length of the lobe at its attachment to the central portion. Support for this amendment may be found in Figures 1 and 2.

Tynan fails to teach or suggest that the outer periphery can be shorter than the portion attaching the lobe to the central portion. Instead, the Tynan patent discloses an outer periphery that is much longer than the portion attaching the lobe to the central portion. This is permitting is a counter-rotating apparatus. However, many screw extruders are co-rotating, and therefore, such as long outer periphery ridge would render the kneading element of the present invention inoperable. Thus, the Applicant respectfully requests reconsideration and withdrawal of the instant rejection.

Next, the Examiner has rejected claims 1, 2, 4-5, 9-10, 12-13, and 15-19 as being anticipated by Japanese Published Application No. 6-90651 (hereinafter JP 6-90651). Likewise, the Applicant respectfully traverses this rejection.

Again, JP 6-90651 relates to a metallic shutter having a kneading screw used in the production of dough, not a screw extruder and, therefore, like D'Alterio and the other references above, does not use a kneading element of the type claimed in the present invention. A kneading apparatus of that type is not a screw extruder, and the kneading element of the present invention would not be used on such an apparatus.

This notwithstanding, the Applicant again notes that this published application, like D'Alterio, does not include an outer periphery ridge as defined by the claims and, assuming arguendo, that it does disclose such an outer periphery ridge, then it does not include the limitation that the outer periphery ridge traces an arc that is concentric with a substantially circular outer limit of the central portion. Again, the present invention has an outer periphery ridge that is substantially equidistant or parallel at all points from the central portion or outer limit of the central portion. In

contrast, the tips of the blades 4a in JP 6-90651 are substantially off set at about a 45° angle from the outer limit of the central portion of each blade.

In addition, JP 6-90651 provides a gap between its blades 4. Thus, claim 9 can further be distinguished from this reference in the fact that the kneading elements must contact one other kneading element in the kneading block. In this reference, the blades do not. Consequently, reconsideration of this rejection is earnestly solicited.

Finally, the Examiner has rejected claims 1, 3-5, 9, 11-13, and 15-19 as being anticipated by Japanese Published Application No. 4-104827 (hereinafter JP 4-104827). The Applicant respectfully traverses this rejection as well.

Again, this reference pertains to an agitator, not a screw extruder and, therefore, does not use a kneading element of the type claimed.

This notwithstanding, the Applicant notes firstly that this reference does not provide a lateral sidewall of one of the lobes of the element as being concave between the outer periphery ridge and the central portion. Instead, the reference shows a convex arc near the top of its lobes before the outer periphery ridge.

Secondly, the Applicant notes that the reference discloses an outer periphery that is much longer than the portion attaching the lobe to the central portion. This is also in contrast to the present invention and as now claimed.

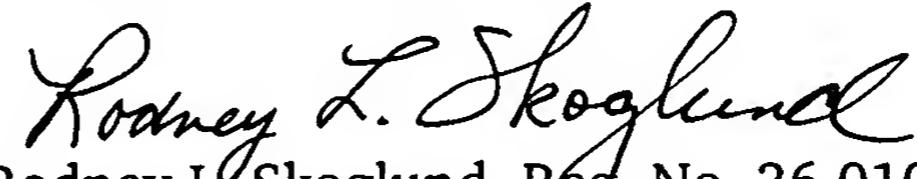
Thirdly, the reference also shows a gap between its agitating bodies. Thus, claim 9 can further be distinguished from this reference in the fact that the kneading elements must contact a portion of one other kneading element in the kneading block. Consequently, reconsideration of this rejection is earnestly solicited.

In light of the foregoing, the Applicant respectfully requests that the application be reviewed again with consideration of the amendments and arguments presented. The Applicant believes that claims 1-21 and 28 are in condition for allowance and earnestly requests notice of the same. It is acknowledged that Claims 22-27 remain withdrawn from the application at present. Should the Examiner care to discuss any of the foregoing, the undersigned attorney would welcome a telephone call.

One new claim has been presented and one dependent claim has been

converted to an independent claim. Accordingly, an additional claims fee is provided herewith. Should the fee be inadequate or overpaid, the Commissioner is hereby authorized to charge or credit Deposit Account No. 18-0987 for any underpayment or overpayment of the fees due.

Respectfully submitted,



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